

INFORMATION REPORT

REPORT

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SUBJECT: Production of Crystals by VEB Carl Zeiss, Jena

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1. Since various types of crystals were needed as important basic material for production, the VEB Carl Zeiss Works in Jena made efforts to develop methods of cultivating crystals permitting quantity production at the lowest possible cost and in the shortest possible time. While, prior to January 1953, five methods had been adopted or were under development, the works constantly strove to procure from abroad the most recent information and designs on this subject to be able to compete with foreign countries.
2. The first method, which had long been employed without any modifications cultivated Seignette type crystals in a cold solution along the lines of an established procedure. The crystals thus obtained were very pure and rather precious and were used for optical purposes or cut into lamellas and delivered to the radio industry.
3. The second method, which had been developed before and during World War II and was re-adopted in 1946, drew rock salt crystals from the molten mass. The crystals thus produced were not as pure as those produced by the first method.
4. The third method cultivated crystals in a solution, using a device which had been developed on the basis of photostated American designs and scientific publications and which was completed in November 1952 and was scheduled to be put into operation in February 1953. This method was expected to speed up considerably the cultivation process.
5. The fourth method which served to produce KRS 5, required a large room set up at the main works which, after a period of one year, was almost completed in late January 1953 and was equipped with 5 molybdenum furnaces, the necessary annealing furnaces, auxiliary equipment and panels. KRS 5 could previously be produced only on laboratory scale. This method, which had been employed during World War II and was reemployed in about 1951 because the Soviets were especially interested, was developed on a larger scale in 1952 when German returnees from the USSR who knew this method from war times and had introduced and tried it in the USSR, were available as working staff. Talks on the production of KRS 5 were avoided at the works.
6. The fifth method cultivated quartz crystals in an autoclave and was completely new. Cultivation experiments at a pressure of 1,000 atmospheres were scheduled to start in an autoclave from Berlin at the old tall building of the plant in the spring of 1953.

Comment. KRS 5 consists of thallium bromide and thallium iodide and is used for the production of prisms, windows and infra-red lenses. For short descriptions of the first four methods and a sketch of the device for the third method. see Annexes 1 and 2.

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ANNEX 1Short Descriptions of 4 Methods of Cultivating CrystalsMethod No 1:

The crystal germs are attached to a slowly rotating frame of nickel rods and dipped into a cold saturated salt solution. Crystals of the Seignette type grow to the weight of 200 to 300 grams in 5 to 6 weeks time.

Method No 2:

The crystal germ consisting of a stone salt lamella is attached to a frame of water-cooled nickel rods rotating 2 to 3 times per day and is dipped into a molten mass which, in a platinum crucible, 180 to 200 mm high and 110 to 120 mm in diameter is heated to about 800°C in an electric furnace. A crystal having approximately the size of the crucible grows in 2 to 3 days time.

Method No 3:

While the American device serving as prototype was completely made of copper, the device built at the Zeiss works consisted of glass, copper, and V2A type steel and included a glass jar of 35 cubic decimeters (a) in which the salt solution was kept at 80°C by means of a thermostat (b), with a condensating container of 16 cubic decimeters (c) on its top. By draining condensed water (d) the concentration of the solution could be increased, thus regulating the growing process. The germs (f) were attached to a frame of V2A-steel rods (e) and were swung in alternating direction by means of a driving gear (g). They were said to reach a maximum weight of up to 2 kg. Although, in January 1953, no production experience was available, it was expected that the growing process of Seignette type crystals could be reduced to a few hours. (This method is illustrated in Annex 2).

Method No 4:

KRS 5, which was a heavy, dark-red and allegedly very poisonous, but not coloring, powder served as basic material which was melted in glass tubes, 150 to 300 mm long and 30 mm in diameter. Several of these glass tubes were heated, and, after cooling down, were smashed. The red bars, which were rather heavy, were cut to slices, 5 mm thick, by means of fine circular saws.

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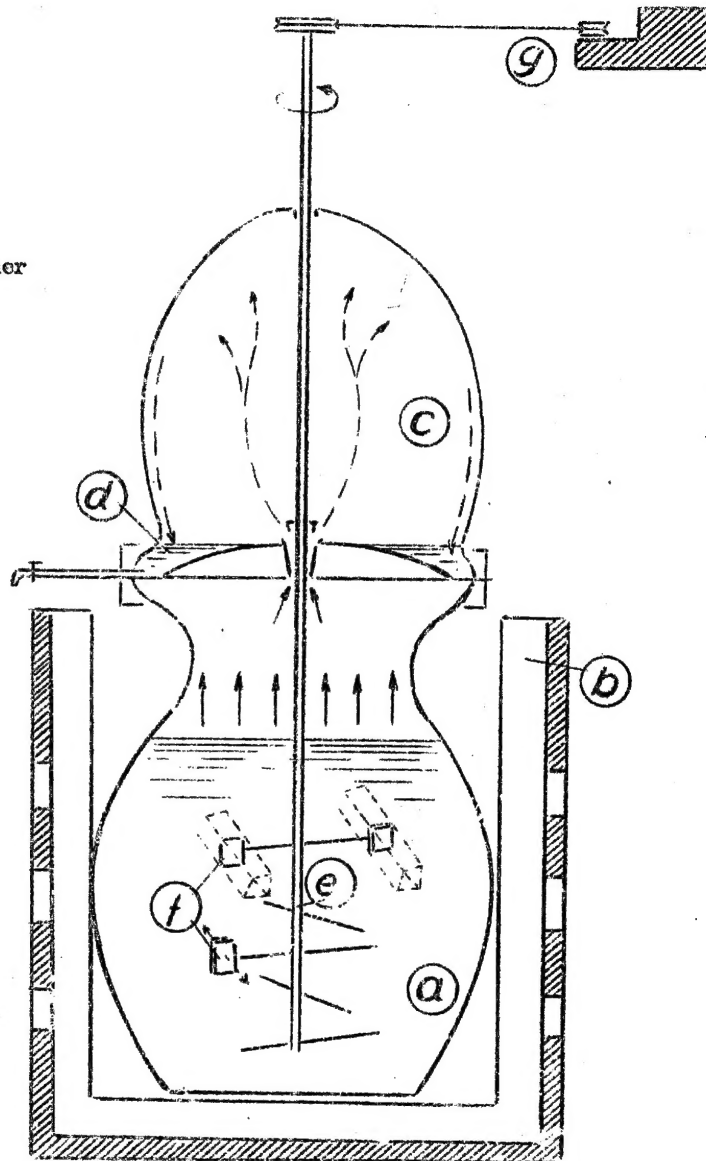
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ANNEX 2

METHOD NO. 3

Legend:

- a glass jar
- b thermostat
- c condensating container
- d condensed water
- e V2A-steel rods
- f germs
- g driving gear



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